California Climate Change

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Outline

- Greenhouse Gas Emission Reduction Targets
- California's water-related activities for GHG emissions reduction and climate change
- Water resources climate change study
- Strategies to address climate change impacts
- Climate Action Team Draft Strategies to reduce GHG emissions (Water Related)

California Greenhouse Gas Production

- 1.4 % of the World's GHG
- 6.2% of the United State's GHG

Executive Order S-3-05
June 1, 2005
Greenhouse Gas Reduction Targets

- By 2010, reduce GHG emissions to 2000 levels. (11% below business as usual – 59 million tons)
- By 2020, reduce GHG emissions to 1990 levels. (25% reduction – 145 million tons)
- By 2050, reduce GHG emissions to 80% below 1990 levels.
- By January 2006 and biannually, report on impacts of global warming to water supply, public health, agriculture, the coastline, and forestry, and prepare reports on mitigation and adaptation plans.

Water-Related Activities

- The State's Water Plan Update 2005 considers climate change impacts to California's water resources, and presents two dozen resource strategies.
- In July 2006, The Department of Water Resources (DWR) released a technical report on climate change impacts to future water resources.
- California Global Warming Act of 2006 (AB32) established the Climate Action Team (CAT)

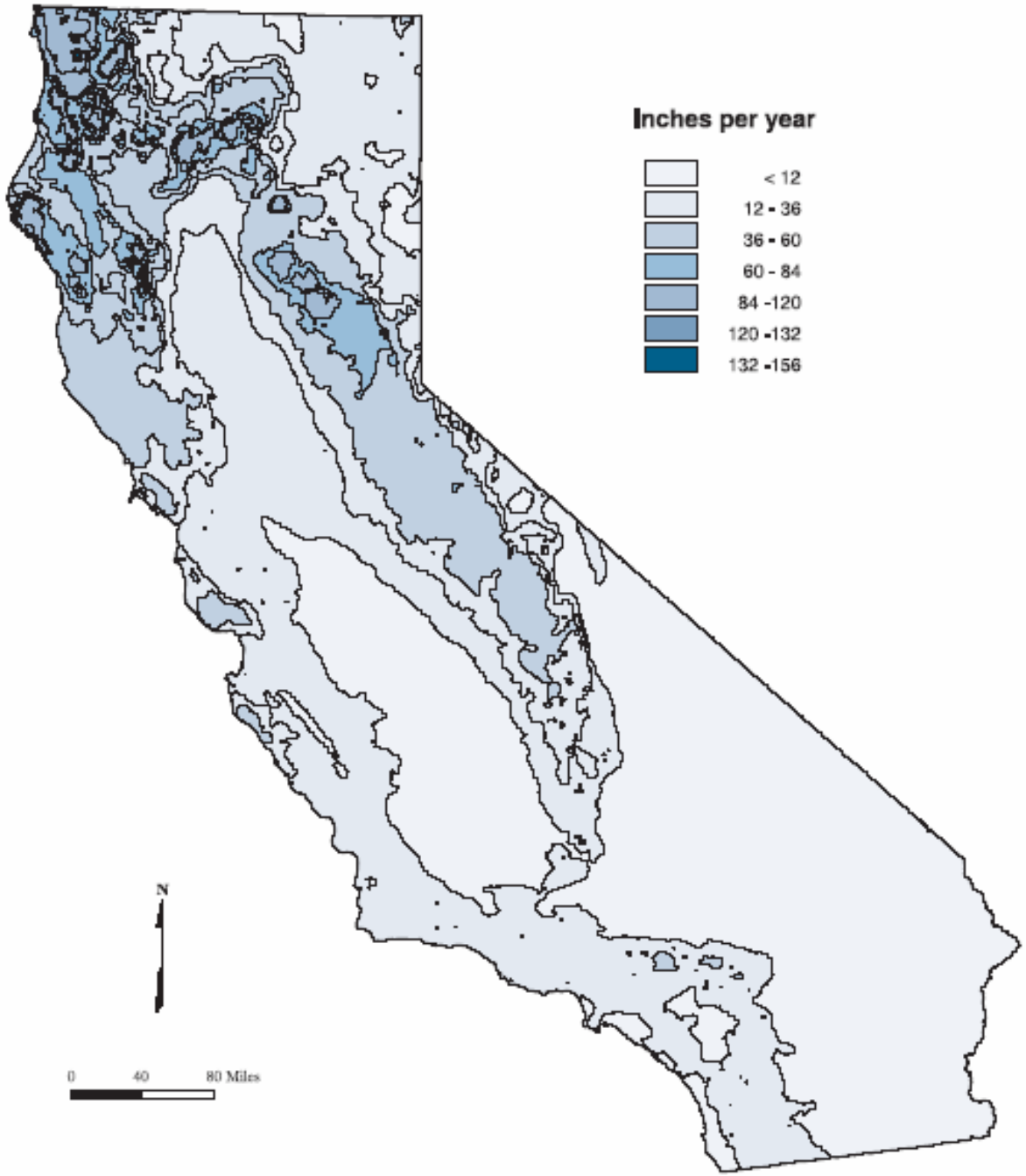
Water-Related Activities

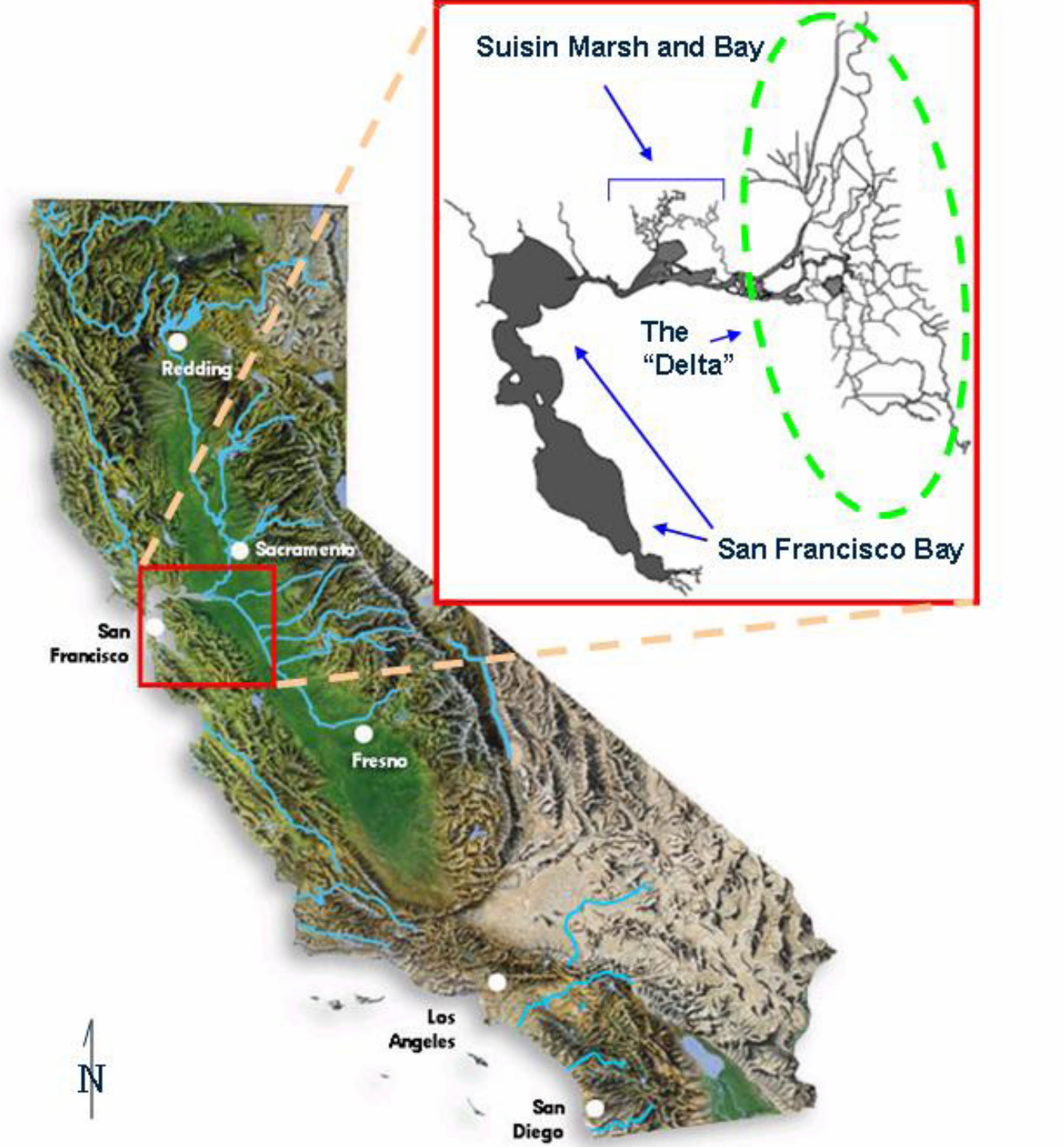
- November 2006, voters passed Propositions 1E and 84 to provide $4.9 billion in new flood management investments, and $1 billion in integrated regional water management and climate change evaluation and adaptation.
- (September 2006) Executive Order S-17-06 established the Delta Vision Task Force.

Progress on Incorporating Climate Change into Management of California's Water Resources

- Study by CA DWR, U.S. Bureau of Reclamation, and U. C. Davis examined:
- Snowpack
- Runoff
- Operations of the SWP and CVP
- Delta Water Quality and Water Levels
- Evapotranspiration Rates

Average Annual Precipitation




Suisin Marsh and Bay
The
"Delta"
San Francisco Bay
Redding
Sacramento
San
Francisco
Fresno
Los
Angeles
San
Diego
N

CA Water Projects

Data (Air Temperature)

- 100 years of data
- 226 temperature stations
- Max., ave., and min. air temperatures show an increasing trend of 1° C.
- On average, global warming could cause fewer extreme cold temperature days.

Data (Precipitation)

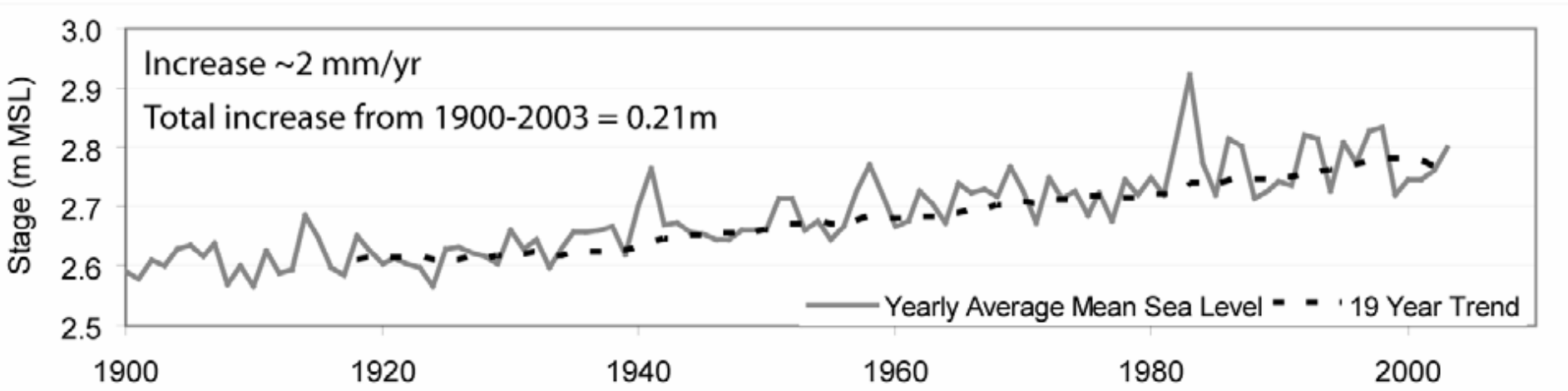
- 102 stations from 1890 to 2002
- Ave. annual precipitation = 605mm
- Last 20 years was the wettest period, but no significant trend.
- Global warming could affect the amount, form and timing of precipitation.

Data (Runoff)

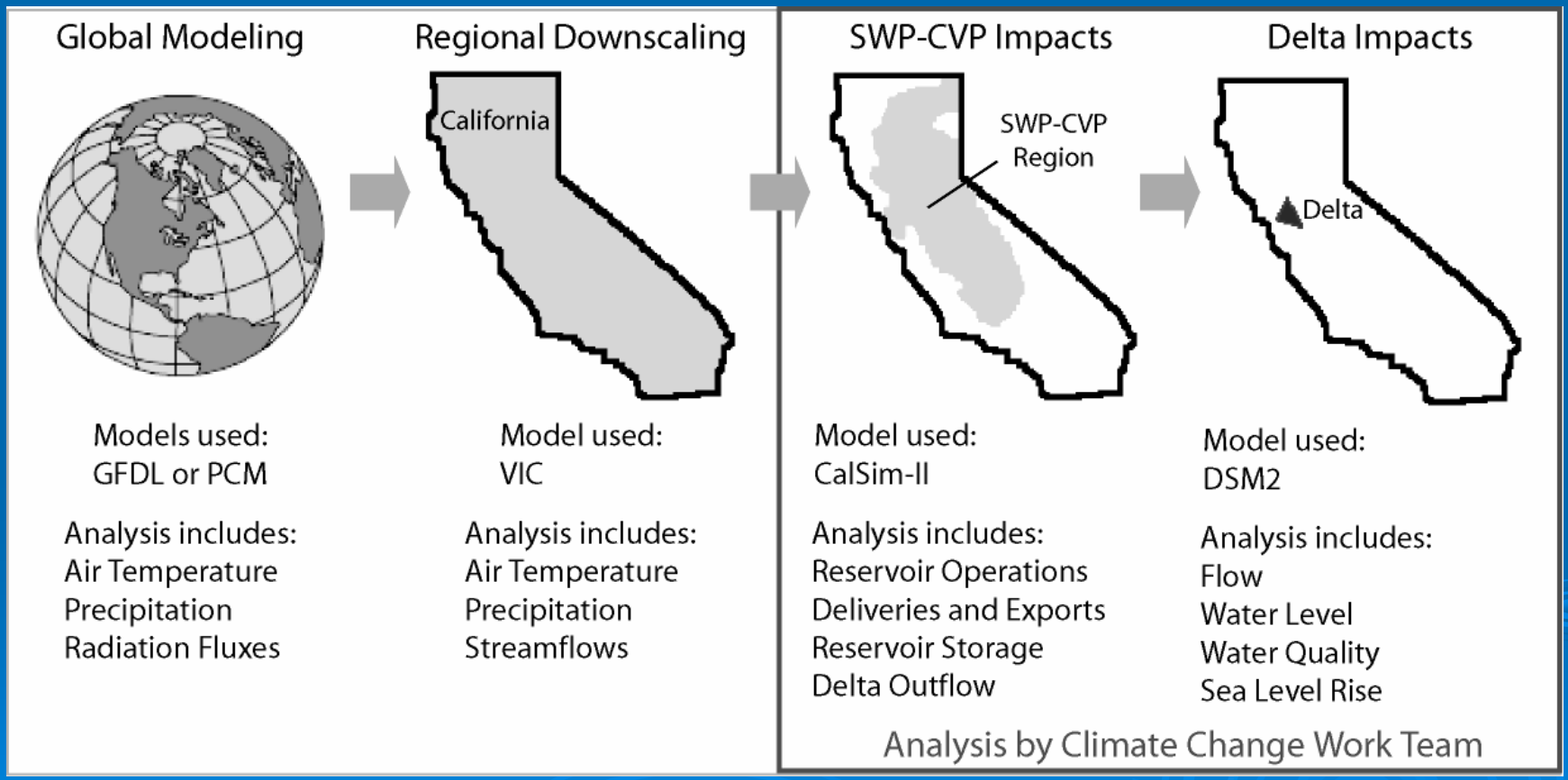
- 100 years of data for the Sacramento and San Joaquin River Basins
- No significant change in total runoff volume
- April – July runoff volume decreased by 23% for Sacramento Basin and 19% for the San Joaquin Basin
- Indicates earlier snowpack melting

Data (Sea Level Rise)

- 100 years of data
- Sea level at the Golden Gate has risen 0.21 meters
- Global warming is expected to cause an additional sea level rise of 0.09m to
- 0.88 m by 2100



Modeling Approach



Climate Change Impacts

- By 2050, projected loss of 25% of the Sierra Snowpack = 4.5 MAF
- Weather patterns are becoming more variable, causing more sever winter and spring flooding and longer, drier droughts.
- Since the 1950s, flood flows on many California rivers have been the largest on record.

Climate Change Impacts

- Projected Sea Level Rise will threaten coastal communities and sustainability of the Sacramento-San Joaquin Delta.
- Rising water temperatures and changes in runoff patterns may adversely impact salmon and other aquatic species.

Strategies to Address Climate Change impacts

- Increase monitoring of climatologic and water resource conditions
- Improve flood-forecasting ability and climate change models to assess future flood protection needs
- Refine projections to climate change consequences on water supply and reliability

Strategies to Address Climate Change Impacts

- Conduct system re-operation studies to improve reliability and maintain sufficient flood reservation
- Assess climate change effects on hydropower production
- Reduce GHG emissions from water management activities

Strategies to Address Climate Change Impacts

- Study the combined effects of increased atmospheric carbon dioxide and increased temperature on crop water needs to predict future demand
- Analyze the effect of sea level rise on Delta salinity and levees

Strategies to Address Climate Change Impacts

- Adapt statewide water management systems by incorporating more flexibility
- Improve interaction and coordination with other state, federal, and academic researchers

CAT Draft Strategies (Water Recycling)

- Approximately 19% of electricity and 30% of natural gas consumed in CA are used to deliver, treat and dispose of water.
- Require Water Recycling Plans at Wastewater Treatment Plants
- Goal to increase municipal wastewater recycling from 10% to 23% by 2030

CAT Draft Strategies (Urban Water Reuse)

- Increase regional stormwater capture, infiltration, and groundwater recharge
- Adopt Low Impact Development to reduce stormwater runoff and increase infiltration
- Construct small dispersed facilities to capture and reuse dry weather flows

CAT Draft Strategies (End Use Water Conservation and Efficiency)

- Reduction of GHG Emissions through Water Use Efficiency
- Governor has called for a 20 % reduction (1.76 MAF) in per capita water use statewide by 2020
- A water use efficiency measure will be developed to be included in the California Water Plan Update 2009

CAT Draft Strategies (Energy Intensity of Water Systems)

- Implement cost effective energy efficiency measures in water system infrastructure projects
- Construct tools and protocols to evaluate, measure, and verify the energy impacts of water systems and end use conservation and efficiency activities/programs.
- Conduct research and demonstration projects that explore ways to reduce the energy intensity of the water use cycle.

CAT Draft Strategies
(Increase Renewable Energy Production)

- Develop renewable projects that can be co-located with existing water system infrastructure
- Renewable projects are sources of energy that are naturally replenished instead of fossil fuels.

Websites for Status and Further Information

- www.climatechange.ca.gov
- www.water.ca.gov/climatechange/